



Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV.

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Table 1. Prophylaxis to Prevent First Episode of Opportunistic Disease (page 1 of 7)

(Last updated November 21, 2019; last reviewed November 21, 2019)

Opportunistic Infections	Indication	Preferred	Alternative
Coccidioidomycosis	A new positive IgM or IgG serologic test in patients who live in a disease-endemic area and with CD4 count <250 cells/ μ L (BIII)	Fluconazole 400 mg PO daily (BIII)	
Hepatitis A Virus (HAV) Infection	HAV-susceptible patients with chronic liver disease, or who are injection-drug users, or MSM (AII) .	Hepatitis A vaccine 1 mL IM x 2 doses at 0 and 6–12 months (AII) . IgG antibody response should be assessed 1 month after vaccination; non-responders should be revaccinated when CD4 count >200 cells/ μ L. (BIII) .	<u>For patients susceptible to both HAV and hepatitis B virus (HBV) infection (see below):</u> Combined HAV and HBV vaccine (Twinrix [®]), 1 mL IM as a 3-dose (0, 1, and 6 months) or 4-dose series (days 0, 7, 21 to 30, and 12 months) (AII)

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Opportunistic Infections	Indication	Preferred	Alternative
Hepatitis B Virus (HBV) Infection	<ul style="list-style-type: none"> Patients without chronic HBV or without immunity to HBV (i.e., anti-HBs <10 international units/mL) (AII) Vaccination is recommended before CD4 count falls below 350 cells/μL (AII). In patients with CD4 counts 350 cells/μL, vaccination should not be deferred until CD4 count reaches >350 cells/μL, because some patients with CD4 counts <200 cells/μL do respond to vaccination (AII). 	<ul style="list-style-type: none"> HBV vaccine IM (Engerix-B 20 μg/mL or Recombivax HB 10 μg/mL), 0, 1, and 6 months (AII), <i>or</i> HBV vaccine IM (Engerix-B 40 μg/mL or Recombivax HB 20 μg/mL), 0, 1, 2 and 6 months (BI), Vaccine conjugated to CpG (Heplisav-B®) IM at 0 and 1 months (CIII) – a 2-dose series can only be used when both doses given are Heplisav-B®. Combined HAV and HBV vaccine (Twinrix®), 1 mL IM as a 3-dose (0, 1, and 6 months) or 4-dose series (days 0, 7, 21 to 30, and 12 months) (AII) <p>Anti-HBs should be obtained 1 month after completion of the vaccine series. Patients with anti-HBs <10 international units/mL at 1 month are considered non-responders (BIII).</p> <p><u>For patients with isolated anti-HBc</u></p> <ul style="list-style-type: none"> One standard dose of HBV vaccine followed by anti-HBs at 1-2 months. If the titer is >100 IU/mL, no further vaccination is needed, but if it is <100 IU/mL, a complete series of HBV vaccine should be completed followed by anti-HBs testing (BII). 	Some experts recommend vaccinating with 40-μg doses of either HBV vaccine (CIII) .
	<p><u>Vaccine Non-Responders:</u></p> <ul style="list-style-type: none"> Anti-HBs <10 international units/mL 1 month after vaccination series For patients with low CD4 counts at time of first vaccine series, some experts might delay revaccination until after a sustained increase in CD4 count with ART (CIII). 	Re-vaccinate with a second vaccine series (BIII)	<ul style="list-style-type: none"> HBV vaccine IM (Engerix-B 40 μg/mL or Recombivax HB 20 μg/mL), 0, 1, 2 and 6 months (BI).

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Opportunistic Infections	Indication	Preferred	Alternative
Histoplasmosis	CD4 count ≤ 150 cells/ μ L and at high risk because of occupational exposure or live in a community with a hyperendemic rate of histoplasmosis (>10 cases/100 patient-years) (BI)	Itraconazole 200 mg PO daily (BI)	
Human Papillomavirus (HPV) Infection	Females and males aged 13–26 years (AIII)	<ul style="list-style-type: none"> HPV recombinant vaccine 9 valent (Types 6, 11, 16, 18, 31, 33, 45, 52, 58) 0.5 mL IM at 0, 1–2, and 6 months (AIII) 	For patients who have completed a vaccination series with the recombinant bivalent or quadrivalent vaccine, many experts would give an additional full series of recombinant 9-valent vaccine, but there are no data to define who might benefit or how cost effective this approach might be (CIII) .
Influenza A and B Virus Infection	All persons with HIV (AIII)	<p>Inactivated influenza vaccine annually (per recommendation for the season) (AIII)</p> <p>High-dose inactivated influenza vaccine may be given to individuals aged ≥ 65 years (CIII).</p> <p>Live-attenuated influenza vaccine is contraindicated in patients with HIV (AIII).</p>	N/A
Malaria	Travel to disease-endemic area	Recommendations are the same for HIV-infected and HIV-uninfected patients. Recommendations are based on region of travel, malaria risks, and drug susceptibility in the region. Refer to the following website for the most recent recommendations based on region and drug susceptibility: http://www.cdc.gov/malaria/ .	
<i>Mycobacterium avium</i> Complex (MAC) Disease	<p>For CD4 Count <50 cells/mm^3</p> <ul style="list-style-type: none"> Not recommended for those who immediately initiate ART (AII). Recommended for those who are not on fully suppressive ART, after ruling out active disseminated MAC disease (AI). 	<ul style="list-style-type: none"> Azithromycin 1200 mg PO once weekly (AI), <i>or</i> Clarithromycin 500 mg PO BID (AI), <i>or</i> Azithromycin 600 mg PO twice weekly (BIII) 	Rifabutin (dose adjusted based on concomitant ART) ^a (BI) ; rule out active TB before starting rifabutin.

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Opportunistic Infections	Indication	Preferred	Alternative
<i>Mycobacterium tuberculosis</i> Infection (TB) (i.e., treatment of latent TB infection [LTBI])	<p>Positive screening test for LTBI,^b with no evidence of active TB, and no prior treatment for active TB or LTBI (AI)</p> <p><i>or</i></p> <p>Close contact with a person with infectious TB, with no evidence of active TB, regardless of screening test results (AI).</p>	<p>(INH 300 mg plus pyridoxine 25-50 mg) PO daily for 9 months (AII)</p> <p><i>or</i></p> <p>LTBI treatment and ART act independently to decrease the risk of TB disease. Thus, ART is recommended for all persons with HIV and LTBI (AI).</p>	<p>Rifapentine (see dose below) PO plus INH 900 mg PO plus pyridoxine 50 mg PO once weekly for 12 weeks (AII)</p> <p>Note: Rifapentine only recommended for persons receiving RAL or EFV-based ART regimen</p> <p><u>Rifapentine Weekly Dose</u> <u>Weighing 32.1 to 49.9 kg:</u></p> <ul style="list-style-type: none"> • 750 mg <p><u>Weighing >50 kg:</u></p> <ul style="list-style-type: none"> • 900 mg <p><i>or</i></p> <p>Rifampin 600 mg PO daily for 4 months (BI)</p> <p><i>or</i></p> <p>For persons exposed to drug-resistant TB, select anti-TB drugs after consultation with experts or public health authorities (AII).</p>
<i>Pneumocystis</i> Pneumonia (PCP)	<ul style="list-style-type: none"> • CD4 count <200 cells/mm³ (AI), <i>or</i> • CD4 <14% (BII), <i>or</i> • If ART initiation must be delayed, CD4 count ≥200, but <250 cells/mm³ and if monitoring of CD4 cell count every 3 months is not possible (BII) <p>Note: Patients who are receiving pyrimethamine/sulfadiazine for treatment or suppression of toxoplasmosis do not require additional PCP prophylaxis (AII).</p>	<ul style="list-style-type: none"> • TMP-SMX^c 1 DS tablet PO daily (AI), <i>or</i> • TMP-SMX^c 1 SS tablet daily (AI) 	<ul style="list-style-type: none"> • TMP-SMX^c 1 DS PO three times weekly (BI), <i>or</i> • Dapsone^d 100 mg PO daily or 50 mg PO BID (BI), <i>or</i> • Dapsone^d 50 mg PO daily with (pyrimethamine^e 50 mg plus leucovorin 25 mg) PO weekly (BI), <i>or</i> • (Dapsone^d 200 mg plus pyrimethamine^e 75 mg plus leucovorin 25 mg) PO weekly (BI); <i>or</i> • Aerosolized pentamidine 300 mg via Respigard II™ nebulizer every month (BI), <i>or</i> • Atovaquone 1500 mg PO daily (BI), <i>or</i> • (Atovaquone 1500 mg plus pyrimethamine^e 25 mg plus leucovorin 10 mg) PO daily (CIII)

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Opportunistic Infections	Indication	Preferred	Alternative
<i>Streptococcus pneumoniae</i> Infection	For individuals who have never received any pneumococcal vaccine, regardless of CD4 count	PCV13 0.5 mL IM one time (AI) followed by: <i>If CD4 Count ≥ 200 cells/mm³</i> <ul style="list-style-type: none"> • PPV23 0.5 mL IM at least 8 weeks after the PCV13 vaccine (AI). <i>If CD4 Count < 200 cells/mm³</i> <ul style="list-style-type: none"> • PPV23 can be offered at least 8 weeks after receiving PCV13 (CIII), or • Can wait until CD4 count increased to > 200 cells/mm³ on ART (BIII). 	PPV23 0.5 mL IM one time (BII)
	For individuals who have previously received PPV23	One dose of PCV13 should be given at least 1 year after the last receipt of PPV23 (AII) . Adults (aged ≥ 19 years) should wait at least 1 year, and adolescents (aged < 19 years) should wait at least 8 weeks after last receipt of PPV23 (BIII) .	N/A
	<u>Re-Vaccination</u> <ul style="list-style-type: none"> • If aged 19–64 years and ≥ 5 years since the first PPV23 dose • Final dose to be given at age ≥ 65 years, and if ≥ 5 years since the previous PPV23 dose • Typically, no more than 3 doses of PPV23 in a lifetime 	PPV23 0.5 mL IM one time (BII)	N/A
Syphilis	<ul style="list-style-type: none"> • For individuals exposed to a sex partner with a diagnosis of primary, secondary, or early latent syphilis within past 90 days (AII), or • For individuals exposed to a sex partner > 90 days before syphilis diagnosis in the partner, if serologic test results are not available immediately and the opportunity for follow-up is uncertain (AIII) 	Benzathine penicillin G 2.4 million units IM for 1 dose (AII)	<i>For penicillin-allergic patients:</i> <ul style="list-style-type: none"> • Doxycycline 100 mg PO BID for 14 days (BII), or • Ceftriaxone 1 g IM or IV daily for 8–10 days (BII), or • Azithromycin 2 g PO for 1 dose (BII) – not recommended for MSM or pregnant women (AII)
Talaromycosis (Penicilliosis)	Persons with HIV and CD4 cell counts < 100 cells/mm ³ , who are unable to have ART, or have treatment failure without access to effective ART options, and 1) Who reside in the highly endemic regions ^a in northern Thailand, northern or southern Vietnam, or southern China (BI) , or 2) Who are from countries outside of the endemic region, and must travel to the region (BIII) ^a Particularly in highland regions during the rainy and humid months	For persons who reside in endemic areas, itraconazole 200 mg PO once daily (BI) . For those traveling to the highly endemic regions, begin itraconazole 200 mg PO once daily 3 days before travel, and continue for 1 week after leaving the endemic area (BIII) .	For persons who reside in endemic areas, fluconazole 400 mg PO once weekly (BII) . For those traveling to the highly endemic regions, take the first dose of fluconazole 400 mg 3 days before travel, continue 400 mg once weekly, and take the final dose after leaving the endemic area (BIII) .

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Opportunistic Infections	Indication	Preferred	Alternative
<i>Toxoplasma gondii</i> Encephalitis	<ul style="list-style-type: none"> • Toxoplasma IgG-positive patients with CD4 count <100 cells/μL (AII) <p>Note: All regimens recommended for primary prophylaxis against toxoplasmosis are also effective as PCP prophylaxis.</p>	TMP-SMX ^c 1 DS PO daily (AII)	<ul style="list-style-type: none"> • TMP-SMX^c 1 DS PO three times weekly (BIII), <i>or</i> • TMP-SMX^c 1 SS PO daily (BIII), <i>or</i> • Dapsone^d 50 mg PO daily + (pyrimethamine^e 50 mg + leucovorin 25 mg) PO weekly (BI), <i>or</i> • (Dapsone^d 200 mg + pyrimethamine^e 75 mg + leucovorin 25 mg) PO weekly (BI); <i>or</i> • Atovaquone 1500 mg PO daily (CIII); <i>or</i> • (Atovaquone 1500 mg + pyrimethamine^e 25 mg + leucovorin 10 mg) PO daily (CIII)
Varicella Zoster Virus (VZV) - Primary Infection	<p><u>Pre-Exposure Prevention:</u></p> <ul style="list-style-type: none"> • Patients with CD4 counts ≥ 200 cells/mm^3 who have not been vaccinated, have no history of varicella or herpes zoster, or who are seronegative for VZV (BIII) <p>Note: Routine VZV serologic testing in adults and adolescents with HIV is not recommended.</p> <p><u>Post-Exposure Prevention:</u></p> <ul style="list-style-type: none"> • Close contact with a person with chickenpox or herpes zoster; and is susceptible (i.e., no history of vaccination or of either condition, or known to be VZV seronegative, particularly those with CD4 counts <200 cells/mm^3) (AIII) 	<p><u>Pre-Exposure Prevention:</u></p> <ul style="list-style-type: none"> • Primary varicella vaccination (VarivaxTM), two doses (0.5 mL SQ each) administered 3 months apart (BIII). <p>If vaccination results in disease because of vaccine virus, treatment with acyclovir is recommended (AIII).</p> <p><u>Post-Exposure Prevention of Primary Varicella Infection:</u></p> <ul style="list-style-type: none"> • Varicella-zoster immune globulin (VariZIGTM) 125 IU per 10 kg (maximum 625 IU) IM, administered as soon as possible, preferably within 96 hours, but up to 10 days after exposure (AIII) <p>Individuals receiving monthly high-dose IVIG (>400 mg/kg) are likely to be protected if the last dose of IVIG was administered <3 weeks before exposure.</p>	<p><u>Pre-Exposure Prevention:</u></p> <ul style="list-style-type: none"> • VZV-susceptible household contacts of susceptible HIV-infected persons should be vaccinated to prevent potential transmission of VZV to their HIV-infected contacts (BIII). <p><u>Alternative Post-Exposure Prevention:</u></p> <ul style="list-style-type: none"> • Acyclovir 800 mg PO five times a day for 5–7 days beginning 7–10 days after exposure (BIII), <i>or</i> • Valacyclovir 1 g PO three times a day for 5–7 days (BIII) <p>These alternatives have not been studied in the HIV population.</p>

^a Refer to the [Drug Interactions](#) section in the [Adult and Adolescent Antiretroviral Guidelines](#) for dosing recommendations.

^b Screening tests for LTBI include TST or IGRA.

^c TMP-SMX DS once daily also confers protection against toxoplasmosis and many respiratory bacterial infections; lower dose also likely confers protection.

^d Patients should be tested for G6PD before administration of dapsone or primaquine. Alternative agent should be used in patients found to have G6PD deficiency.

^e Refer to [Daraprim Direct](#) for information regarding how to access pyrimethamine.

Key to Acronyms: anti-HBc = hepatitis B core antibody; anti-HBs = hepatitis B surface antibody; ART = antiretroviral therapy; BID = twice daily; BIW = twice a week; CD4 = CD4 T lymphocyte cell; DOT = directly observed therapy; DS = double strength; EFV = efavirenz; G6PD = glucose-6-phosphate dehydrogenase; HAV = hepatitis A virus; HBV = hepatitis B virus; HPV = human papillomavirus; IgG = immunoglobulin G; IgM = immunoglobulin M; IGRA = interferon-gamma release assays; IM = intramuscular; INH = isoniazid; IU = international units; IV = intravenously; IVIG = intravenous immunoglobulin; LTBI = latent tuberculosis infection; MAC = *Mycobacterium avium* complex; N/A = not applicable PCP = *Pneumocystis pneumonia*; PCV13 = 13-valent pneumococcal conjugate vaccine; PO = orally; PPV23 = 23-valent pneumococcal polysaccharides vaccine; RAL = raltegravir; SQ = subcutaneous; SS = single strength; TB = tuberculosis; TMP-SMX = trimethoprim-sulfamethoxazole; TST = tuberculin skin test; VZV = varicella zoster virus

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Evidence Rating:

Strength of Recommendation:

A: Strong recommendation for the statement

B: Moderate recommendation for the statement

C: Optional recommendation for the statement

Quality of Evidence for the Recommendation:

I: One or more randomized trials with clinical outcomes and/or validated laboratory endpoints

II: One or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes

III: Expert opinion

In cases where there are no data for the prevention or treatment of an OI based on studies conducted in HIV-infected populations, but data derived from HIV-uninfected patients exist that can plausibly guide management decisions for patients with HIV/AIDS, the data will be rated as III but will be assigned recommendations of A, B, C depending on the strength of recommendation.